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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,515	03/09/2004	Ronald L. Gordon	FIS920030380	2514

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LAW OFFICE OF DELIO & PETERSON, LLC.
121 WHITNEY AVENUE
NEW HAVEN, CT 06510

EXAMINER

RASHID, DAVID

ART UNIT	PAPER NUMBER
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2624

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/708,515	Applicant(s) GORDON ET AL.	
	Examiner David P. Rashid	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/9/2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/9/2004, 6/11/2004</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Drawings

1. The following is a quote from 37 CFR 1.84(u)(1):
View numbers must be preceded by the abbreviation "FIG."
2. FIG. 1 through FIG. 6 are objected under 37 CFR 1.84(u)(1) for failing to properly abbreviate the view numbers – suggest abbreviating with "FIG" (e.g. "Fig. 1" to "FIG. 1")
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character mentioned in the specification: "52" in FIG. 4.
4. FIG. 6 is objected to under 37 CFR 1.83(a) because they fail to show subject matter as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). It is suggested to add "storage device" in box element 142, "microprocessor" in box element 144, and "computer" in box element 140.
5. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet

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submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

6. The following is a quote from 37 CFR 1.72:

(b) A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading “Abstract ” or “Abstract of the Disclosure.” The sheet or sheets presenting the abstract may not include other parts of the application or other material. The abstract in an application filed under 35 U.S.C. 111 may not exceed 150 words in length. The purpose of the abstract is to enable the United States Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure.

7. The abstract is objected to for the following reasons the title of the invention is contained on the abstract sheet – suggest removing the title of the invention from the abstract sheet.

8. The specification is objected to because of the following informalities:

(i) paragraph [0024], line 7 contains a typographical error – suggest changing to “pair-wise”

Appropriate correction is required.

Claim Objections

9. **Claims 1 through 20** are objected to because of the following informalities:

(i) The claims are not properly numbered when using custom notation (e.g. “[c1]” for claim 1) and depending from another claim from which the custom notation is not being used (e.g. “The method of claim 1...” for dependent claim 2) – it is suggested to convert the custom

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notation for each claim to be in consistent format with the claims from which are dependent (i.e. change “[c1]” to “1.” and so forth for all claims).

Appropriate correction is required.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. **Claims 1, 3, 8, 9, 10, 12, 16 and 18** are rejected under 35 U.S.C. 102(e) as being anticipated by Robles et al. (US 2004/0005089 A1).

Regarding **claim 1**, Robles discloses a method of creating a photomask layout (FIG. 5) for projecting an image of an integrated circuit design (paragraphs [0003], [0004]) comprising:

creating a layout (FIG. 3) of spaced (FIG. 3, element 315) integrated circuit shapes (FIG. 3, elements 310, 320) to be projected via the photomask;

determining bisectors (“centered between them” and “predetermined distances” in paragraph [0017]) between adjacent ones (FIG. 3) of the spaced integrated circuit shapes; and

creating sub-resolution assist features (FIG. 3, elements 335, 355) along at least some of the bisectors between the adjacent ones of the spaced integrated circuit shapes.

Regarding **claim 3**, Robles discloses the method of claim 1 wherein the adjacent ones of the spaced integrated circuit shapes (FIG. 3, elements 310, 320 wherein the elements are “adjacent”) are parallel to each other (elements 310 and 320 are also parallel to each other) and the sub-resolution assist features (FIG. 3, elements 335, 355) along the bisectors (“centered between them” and “predetermined distances” in paragraph [0017]) are parallel (FIG. 3, element 335 is parallel to elements 310 and 335) to the spaced integrated circuit shapes.

Regarding **claim 8**, Robles discloses the method of claim 1 wherein the integrated circuit shapes (FIG. 3, elements 310, 320) are two-dimensional (elements 310, 320 in FIG. 3 are two-dimensional) and include shapes having edges parallel (FIG. 3, elements 330/350 and 340 are parallel) and perpendicular (elements 310 and 320 in FIG. 3 contain edges other than edges 330/350 and 340 that are perpendicular) to each other, between which the bisectors are located (FIG. 3, elements 335, 355).

Regarding **claim 9**, Robles discloses the method of claim 1 wherein the integrated circuit shapes (FIG. 3, elements 310, 320) are two-dimensional (elements 310, 320 in FIG. 3 are two-dimensional) and include shapes having lengths of parallel edges (FIG. 3, elements 330 and 340 are parallel) in which an edge of one shape ends at a point (the bottom point of edge 340 in FIG. 3) within the length of the other shape (FIG. 3, element 330 continues to extend beyond the bottom point of edge 340 unto edge 350), between which the bisectors are located (FIG. 3, elements 335, 355).

Regarding **claim 10**, claim 1 recites identical features as in the program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine

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to perform method steps (FIG. 11, FIG. 12) as in claim 1. Thus, references/arguments equivalent to those presented above for claim 1 are equally applicable to claim 10.

Regarding **claim 12**, claim 3 recites identical features as in claim 12. Thus, references/arguments equivalent to those presented above for claim 3 are equally applicable to claim 12.

Regarding **claim 16**, claim 1 recites identical features as in the article manufacture comprising a computer-usable medium having computer readable program codes means embodied therein (FIG. 11, FIG. 12) as in claim 1. Thus, references/arguments equivalent to those presented above for claim 1 are equally applicable to claim 10. All means-plus-function language is anticipated by Robles (FIG. 11, FIG. 12).

Regarding **claim 18**, claim 3 recites identical features as in claim 18. Thus, references/arguments equivalent to those presented above for claim 3 are equally applicable to claim 18.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. **Claims 2, 11, and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Robles et al. (US 2004/0005089 A1) and Papadopoulou et al. (US 6,178,539 B1).

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Regarding **claim 2**, while Robles discloses the method of claim 1, Robles does not teach wherein the bisectors are determined by creating Voronoi cells around the spaced integrated circuit shapes.

Papadopoulou discloses a method for determining critical areas for circuit layouts (FIG. 22) by creating Voronoi cells (FIG. 5) around the spaced integrated circuit shapes (“set C of polygons” in Col. 5, lines 48 - 50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Robles to create Voronoi cells around the spaced integrated circuit shapes as taught by Papadopoulou “...for computing the critical area for shorts in a circuit layout.”, Papadopoulou, Col. 5, lines 7 – 8 and “...to arrive at a partitioning of the layout into regions...”, Papadopoulou, Col. 5, lines 61 – 62.

Regarding **claim 11**, claim 2 recites identical features as in claim 11. Thus, references/arguments equivalent to those presented above for claim 2 are equally applicable to claim 11.

Regarding **claim 17**, claim 2 recites identical features as in claim 17. Thus, references/arguments equivalent to those presented above for claim 2 are equally applicable to claim 17. All means-plus-function language is anticipated by Robles (FIG. 11, FIG. 12).

14. **Claims 4, 13, and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Robles et al. (US 2004/0005089 A1) and LaCour (US 2002/0155357 A1).

Regarding **claim 4**, while Robles discloses the method of claim 1, Robles does not teach identifying different types of vertices for the bisectors prior to creating the sub-resolution assist

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features, and prioritizing creation of the sub-resolution assist features in accordance with the type of vertex.

LaCour discloses a prioritization application of resolution enhancement techniques (FIG. 6) that teaches identifying different types of vertices (FIG. 6, element 610; paragraphs [0047] through [0052] where the vertices are either the “generating edges” and “facing edges” that may either be orthogonal or angled) for the bisectors (the bisectors being the lines from which the scattering bars of LaCour are being placed) prior to creating the sub-resolution assist features (the LaCour vertex listing in Col. 8, paragraphs [0047] through [0052] has been already been created before the LaCour algorithm is implemented), and prioritizing creation (FIG. 6, element 612; paragraphs [0053] through [0056]) of the sub-resolution assist features in accordance with the type of vertex.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Robles to identify different types of vertices for the bisectors prior to creating the sub-resolution assist features, and prioritize creation of the sub-resolution assist features in accordance with the type of vertex as taught by LaCour “...to improve the fidelity of the lithography process”, paragraph [0022].

Regarding **claim 13**, claim 4 recites identical features as in claim 13. Thus, references/arguments equivalent to those presented above for claim 4 are equally applicable to claim 13.

Regarding **claim 19**, claim 4 recites identical features as in claim 19. Thus, references/arguments equivalent to those presented above for claim 4 are equally applicable to claim 19. All means-plus-function language is anticipated by Robles (FIG. 11, FIG. 12).

15. **Claims 5, 6, 14, 15 and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Robles et al. (US 2004/0005089 A1) and Lucas et al. (US 2004/0248016 A1).

Regarding **claims 5 and 6**, while Robles discloses the method of claim 1, Robles does not teach extending at least some of the sub-resolution assist features beyond the bisectors on which they are created to connect to other sub-resolution assist features.

Lucas discloses a method of designing a reticle and forming a semiconductor device therewith (paragraph [0006]) that extends (paragraph [0016]) at least some of the sub-resolution assist features (FIG. 3, element 56; FIG. 9, element 156) beyond the bisectors on which they are created to connect (FIG. 9, element 154) to other sub-resolution assist features (FIG. 3, element 52; FIG. 9, element 152).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Robles to extend at least some of the sub-resolution assist features beyond the bisectors on which they are created to connect to other sub-resolution assist features as taught by Lucas "...for improved coverage of the assist features with improved process margin and reduced reticle inspection issues.", Lucas, paragraph [0023].

Regarding **claim 14**, claim 5 recites identical features as in claim 14. Thus, references/arguments equivalent to those presented above for claim 5 are equally applicable to claim 14.

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Regarding **claim 15**, claim 6 recites identical features as in claim 15. Thus, references/arguments equivalent to those presented above for claim 6 are equally applicable to claim 15.

Regarding **claim 20**, claim 5 recites identical features as in claim 20. Thus, references/arguments equivalent to those presented above for claim 5 are equally applicable to claim 20.

16. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Robles et al. (US 2004/0005089 A1) and Frankowsky (US 2002/0182523 A1).

Regarding **claim 7**, while Robles discloses the method of claim 1, Robles does not teach removing at least one of the sub-resolution assist features along the bisectors prior to finalizing the photomask layout.

Frankowsky discloses a method for carrying out a rule-based optical proximity correction with simultaneous scatter bar insertion (paragraph [0015]) that removes at least one of the sub-resolution assist features along the bisectors prior to finalizing the photomask layout (paragraph [0089]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Robles to remove at least one of the sub-resolution assist features along the bisectors prior to finalizing the photomask layout as taught by Frankowsky because “[i]f these scatter bars were not removed, they would be imaged on the substrate in the exposure process in certain circumstances, which is undesirable.”, Frankowsky, paragraph [0089].

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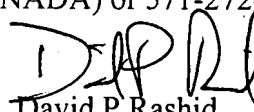
Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578.


The examiner can normally be reached Monday – Friday 8:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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